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Original Research Article

Histomorphological Profile of Central Nervous System Tumors -One Year Prospective Study in Tertiary Care Centre, Southern Tamilnadu

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Abstract:

Background and Objective: Central Nervous system tumors constitute 1.6% of all tumors. The objective of this study is analysis of histomorphological profile of central nervous system tumors.

Method: Hematoxylin and Eosin stained histopathological slides were examined and categorized according to WHO classification of CNS tumors.

Result: Out of 39 cases studied during the study period, most common CNS tumors were Gliomas. 95% of CNS tumors were located intracranially. 5% cases were located in intraspinal region. Glioblastomas (grade IV) were the most common gliomas and Grade I meningiomas were most common meningiomas. Gliomas were more common in males and meningiomas were more common in females.

Conclusion: Tumors of the CNS have diverse clinical and histopathological profile. Although advance imaging modalities are available, histopathology plays important role in diagnosing CNS tumors.

Keywords: CNS tumors, Gliomas, meningiomas, schwannoma, pituitary tumors.

Introduction

The human nervous system is broadly divided into two parts – central and peripheral nervous system. The central nervous system consists of brain and spinal cord and composed of neurons, neuronal processes, supporting cells(glial cells) and blood vessels. Supporting cells include astroytes, oligodendrocytes, ependymal cells and microglia [1]. CNS is invested with meninges and is suspended in cerebrospinal fluid which is produced by choroid plexus.

Tumors of Central Nervous system constitute 1.6% of all tumors. For intracranial tumors the annual incidence is 10-17 per 1,00,000 persons and for intraspinal tumors it is 1-2 per 1,00,000 persons [2]. According to GLOBOCAN 2020 the number of new CNS tumors detected during 2020 is 3,08,102. In India 19,979 males and 12,750 females are affected by CNS tumors in 2020 with cumulative risk of 1 in 419. Majority of these tumors are primary tumors. CNS tumors are the second most common tumor after leukemia in children. Seventy percent of childhood CNS tumors arise in the posterior fossa.

Materials and Methods

The present study was conducted in department of pathology, Madurai Medical College, Madurai over the period of one year from January 2021 to December 2021. It included 39 cases of clinically and radiologically diagnosed CNS tumors. A detailed history including age, sex and location of the tumor was taken. Specimens were fixed in 10% neutral buffered formalin. Grossing was done and bits of 4mm thickness were taken. After tissue processing, sections of 4 micron thickness were taken. Sections were stained with hematoxylin and eosin. Histopathological examination was done.

Observation and Results

Out of 39 cases studied during the study period 12 cases were gliomas, 11 cases were meningioma, 6cases were schwannoma,5 cases were pituitary adenoma,2 cases were metastasis,1case was hemangioblastoma ,1case was germinoma and 1 case was medulloblastoma. Most common CNS tumors were Gliomas(Table I).

Table 1: Incidence of CNS tumors

Histological type	Number of cases	Percentage
Gliomas	12	31.5%
Meningiomas	11	29%
Schwannoma	06	15%
Pituitary adenoma	05	12%
Medulloblastoma	01	2.5%
Metastasis	02	5%
Hemangioblastoma	01	2.5%
Germinoma	01	2.5%

Table 2: Tumor location

Location	Number of cases	Percentage
Intra cranial region	37	95%
Intra spinal region	2	5%

Location of the tumors

In our study 95 % of CNS tumors were located intracranially. 5% cases were located in intraspinal region.

Gliomas

Gliomas are most common CNS tumors with male predominance. In our study 83% of the gliomas cases were seen in Males with Male :Female ratio of 4.5:1(Table-3).

Table 3: Gender wise distribution of gliomas

	Number of cases	Percentage
Female	2	17%
Male	10	83%

In our study Glioblastomas (grade IV)were the most common gliomas accounts for 64% of the gliomas and Anaplastic astrocytomas grade III (18%) were the next most common type (Table-4).

Table 4: Distribution of Gliomas according to WHO Grading

Grading	Number of cases	Percentage
Grade I	1	8%
Grade II	1	8%
Grade III	2	16%
Grade IV	8	68%

Meningiomas: Females are at greater risk than males [5] for meningiomas.In our study 73% of the meningioma cases were females with female male ratio of 2.6:1 (Table-5).

Table 5: Gender wise distribution of Meningiomas

	Number of cases	Percentage
Female	8	73%
Male	3	27%

In our study Grade I meningiomas were most common , Out of 11 cases of meningiomas 10 cases were Grade I meningiomas and one case was Grade III meningiomas (Table-6).

Table 6: Distributions of meningiomas cases according to Grade

Grade	Number of cases	Percentage
Grade I	10	91%
Grade II	Nil	-
Grade III	1	9%

Schwannoma

In our study Schwannomas were third most common CNS tumor.68 % of the cases were located in the cerebellopontine angle. So cerebellopontine angle was the most common location of schwannoma is in our study.

Pituitary adenomas

Pituitary adenomas were the 4th most common tumor in our study and accounts for 12% cases of CNS tumors.

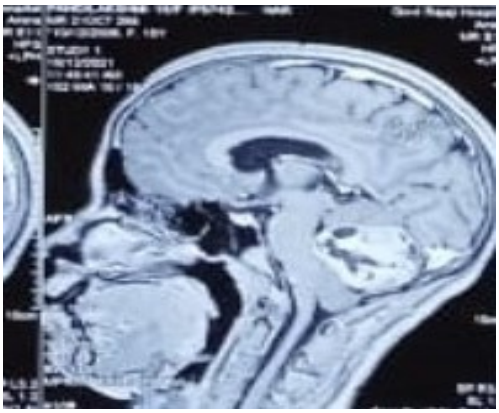

Figure 1: cerebellar tumor

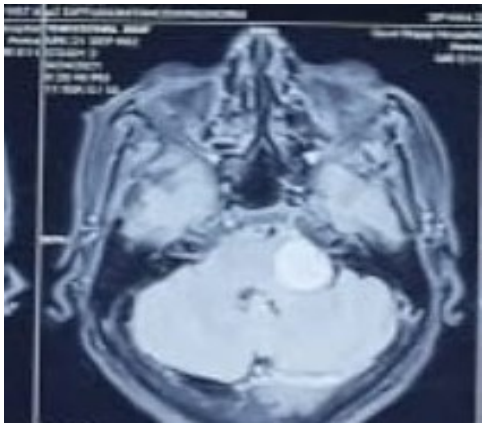

Figure 2: CP angle tumor

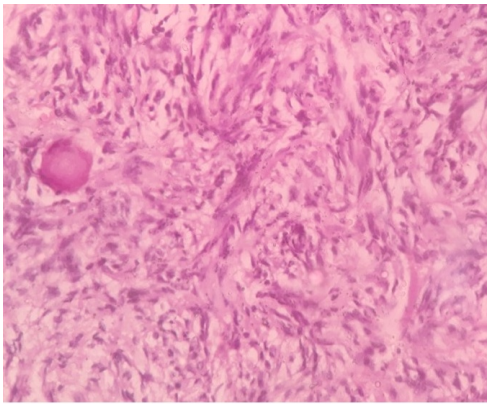

Figure 3: Meningioma

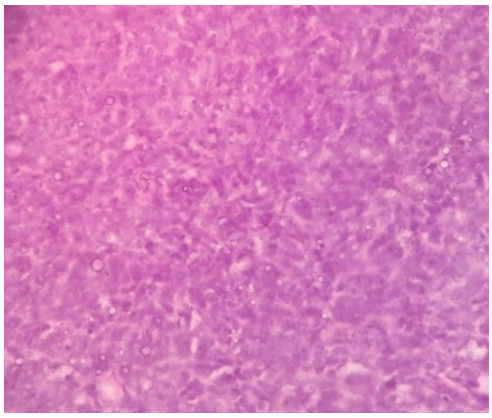

Figure 4: Medulloblastoma

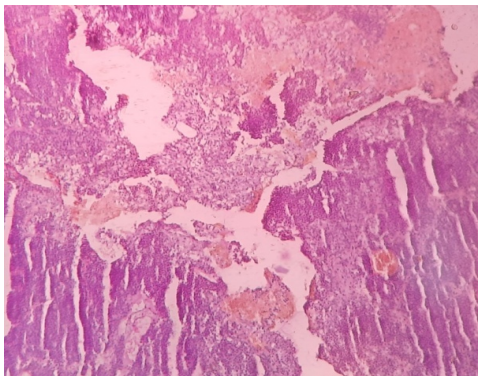

Figure 5: Pituitary adenoma

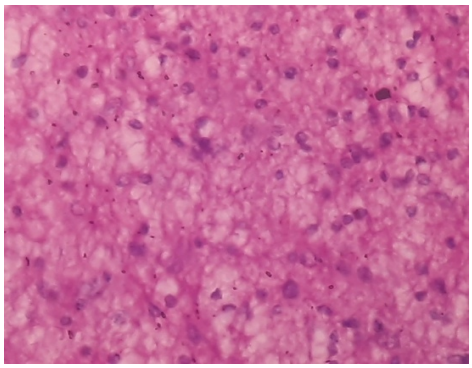

Figure 6: Low grade astrocytoma

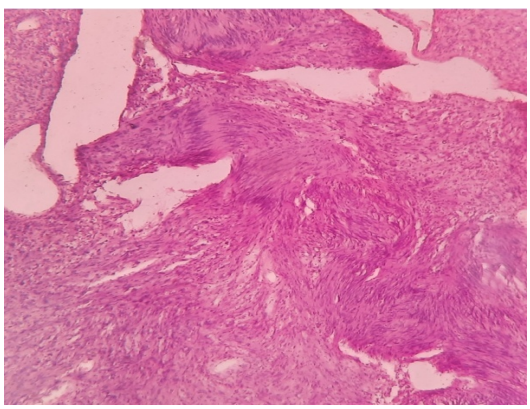

Figure 7: Schwannoma

Discussion

Tumors of central nervous system represents 1.6% of all malignancies and second most common tumor type in children and young adults. 2 out of 3 intracranial tumors are primary and the majority are astrocytic origin, meningiomas or Pituitary tumors. Medulloblastomas, ependymoma, pilocytic astrocytomas and choroid plexus tumors are more common in childhood.

Knowledge of neuroimaging features is helpful in specimen interpretation. A differential diagnosis may be generated based on patient age, tumor location, and neuroimaging features(Fig-1,Fig-2).Neuroimaging also can be helpful in providing correlation with or highlighting discrepancy with pathologic diagnosis (e.g., contrast enhancement with hypocellularity).

CNS Tumors are classified according to presumed cell of origin and biological grade of malignancy derived from microscopic appearance.

WHO Grades for CNS Tumors

Tumor grading is used to predict biological behavior of the neoplasm and used to predict response to therapy and outcome. Grade I tumors are tumors with low malignant potential and possibility of cure after surgical resection alone. Grade II tumors are infiltrative in nature and often recur, despite having low proliferating activity. Grade III tumors have histological evidence of malignancy including nuclear atypia and sometimes brisk mitotic activity. Grade IV tumors are cytologically malignant, mitotically active and necrosis prone with fatal outcome [2].

Clinical course is strongly influenced by location and pattern of the growth. Benign tumors and low grade malignancies are also fatal in some patients like diffuse gliomas are widely infiltrating the adjacent brain parenchyma and are not amenable to complete surgical excision. If the tumor is situated in the critical region is lethal regardless of histologic grade or classification. Tumors in the posterior fossa compresses the vital centers in the medulla results in cardio respiratory arrest.

Gliomas, the most common group of primary brain tumors, include *astrocytomas, oligodendrogliomas*, and *ependymomas* [3]. In our study also gliomas are the most common primary brain tumors. 95% of the CNS tumors are located intracranially and 5% are seen in intraspinal region. Gliomas are most common CNS tumors with male predominance [4,5]. In our study also Gliomas are more commonly seen in males. Meningiomas are predominant benign tumors of adults

that arise from the meningothelial cells of the arachnoid and are usually attached to the dura. A marked female predominance (1.7–3:1) is seen in meningiomas [6,7]. In our study also females are most commonly affected by Meningiomas. Within the cranial vault, most schwannomas occur at the cerebellopontine angle, where they are attached to the vestibular branch of the eighth Nerve [8]. In our study also most common location of Schwannoma is cerebellopontine angle.

Conclusion

Central nervous system tumors constitutes 1.6 % of all tumors. Most common tumors are Meningiomas and Gliomas. Females are most commonly affected by Meningiomas .In contrast male predominance is seen in Gliomas. Glioblastomas(Grade IV) are the most common Glial tumors. Not like other tumors Benign CNS tumors and low grade malignancies are also fatal if the tumor is situated in critical region and because of infiltration into the adjacent brain parenchyma and vital structures.

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